Baker (H.B.)

THE CAUSE OF CHOREA.

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RECENTLY, while at Albany, N. Y., I called upon Prof. George T. Stevens, M. D., who thinks he has attained to a knowledge of the most frequent, if not the only, cause of chorea, sometimes popularly called St. Vitus dance, a serious disease, not infrequently affecting school children, and which has received some attention by this board.* Dr. Stevens kindly explained to me his views, so far as could well be done in the short time at our disposal, gave me a copy of his paper on the subject, which he read before the New York Academy of Medicine, June 15, 1876, and mentioned some additional evidence which he had since collected. I give Dr. Stevens's view of the causation of chorea in his own language, as follows:

"When the normal eye is at rest it has a clear and distinct vision of objects at a distance—that is, at twenty feet or more. As the object viewed approaches the eye, its refraction must be changed, otherwise the image would become dimmed and indistinct. The adjustment of the eye to different distances is performed, unconsciously to the individual, by the contraction of the ciliary muscle, through which the convexity of the crystalline lens is modified. The function by which the eye is thus adapted to different distances is called the function of accommodation. As the object approaches more and more near, the ciliary muscle contracts more and more, until at a certain point it can contract no longer.

*This paper was read at the meeting of the State Board of Health, October 10, 1876.

"If a person with normal eyes brings the object very near them, and thus forces this muscle to unusual contraction, he finds that it soon fatigues, and he can no longer see the object well, for the maximum of the contractile power of this muscle soon exhausts itself.

"In cases of hypermetropia, clear and distinct vision, even of distant objects, can only be obtained by an effort of the accommodative faculty; hence, as the object approaches, the function of accommodation is more severely taxed than in normal eyes. It follows that, while normal eyes are always at rest when accommodated for distance, hypermetropic eyes are never at rest except when closed, and that, when viewing near objects, an excessive effort is required, and that this excessive effort is increased in proportion as the hypermetropia is more considerable.

"Another important fact in this connection is, that, as the object viewed approaches the eyes converge. This may be easily seen by any one who will watch the eyes of another before whom he moves a pencil or other object backward and forward, while the person observed fixes his eyes upon it.

"The effort at accommodation and the effort at convergence are, therefore, simultaneous. They are also proportioned to each other, so that normal eyes accommodated for twelve inches are also converged for twelve inches; but in the hypermetropic person the balance is lost, and such person who accommodates for twelve inches requires an exertion on the part of the ciliary muscle equal to accommodating the normal eye for a nearer point—we will say, for six inches. In such a case, a corresponding convergence of the eyes will take place, and so, while the eyes are accommodated for twelve inches, they are converged for six. Confusion of nervous and muscular action is the result, and to this confusion are due the pain, nausea, and vertigo of the average youth who attempts to read with his grandfather's spectacles, and this is the constant state of confusion of nerve and muscle in cases of anomalous refraction.

"Let it also be borne in mind—and it is a point to which I am not aware that attention has been called—that young children have their eyes almost always accommodated for near objects. The

baby has no interest in the landscape; he plays with his toes, he gazes admiringly at the raspy finger of his nurse Peggotty, held a foot from his nose, or he clinches his rattle in his tiny hands, and stares at its glistening surfaces; at three, four and five, he looks at pictures and toys; at six and seven he is sent to school, where he is forced to look at books. * * *

"Thus it is that in earliest years the ciliary muscle is in a constant state of extreme tension, and that in case of hypermetropia there is perpetual conflict between this muscle of accommodation and the muscles of convergence, except, as it often happens, there is a compromise by which one of the eyes agrees to a permanent squint, thus affording much relief to the little sufferer and great distress to its anxious parents.

"It is while this irrepressible conflict is going on, and while the child with its impressible nature is suffering from this constant fatigue and irritation from muscles overtaxed by extreme tension, and vexed by their failure to harmonize, that he is overworked at school, or is overtaken by measles or whooping cough, or other infantile disease, and while thus debilitated is made an easy victim of the nervous irritation from which he has never been free. Or, perhaps, while on the verge of a loss of control of his muscles, a sudden fright or disappointment becomes the last infliction beyond which the tired and exhausted nervous system can endure no more."

In the paper just quoted from, Dr. Stevens supports his view by thirty-three cases of chorea, in which he had investigated the condition of the eyes. In a note at the close of the article he mentions eight other cases since examined, and then sums up the evience as follows: "Adding these to the cases above reported, we have forty-one cases of chorea, in every one of which anomalous refraction occurs, as follows: hypermetropia, twenty-seven; hypermetropic astigmatism, six; myopic astigmatism, five; unequal degrees of myopia, three; total, forty-one."

Taking the evidence as above summarized alone, it might tend to prove only that chorea and anomalous refraction of the eye are coincident, and both possibly due to a common cause; but Dr. Stevens goes further, and presents evidence tending to the belief

that the acting cause of chorea is removed by simply relieving the eye strain. He mentions several cases in which the chorea rapidly disappeared after the patient had used spectacles suited to the particular case, as determined by a skillful professional man.

For my own part, I was previously prepared to look favorably upon this evidence, for when at our meeting in January last a communication from Dr. Hull, of this city, was read, giving some evidence tending to show that excessive gymnastic exercises were in some way connected with chorea, you may remember I suggested *long-continued muscular restraint* as an element in the causation of the disease. Dr. Stevens seems to believe that the muscular restraint or tension is literally "all in the eye," and he presents the evidence of forty-one cases of chorea examined by him, in all of which there was abnormal tension in the muscles of that organ, and he states that in most of these cases this serious disease could be and was easily remedied by such comparatively simple measures as having the eyes examined by a skillful person familiar with this subject, and the use of such glasses as were in each case found suitable.

I think it may well be doubted, however, if the generalization relative to the cause of chorea can be so restricted as Dr. Stevens seems to think; and it may yet be found that continual muscular tension and consequent nervous exhaustion *in any part of the body* may result in chorea.

Dr. Hal C. Wyman, of Blissfield, Mich., has told me of a case at Ann Arbor, a few years since, of a man who had chorea, from which he recovered soon after the removal of a piece of an iron nail from the bottom of his foot, which nail had been in the foot for a considerable time. In this case the chorea could hardly have been caused, or at least maintained, by abnormal refraction of the eye and consequent eye strain, for the patient recovered without changing the condition of the eye, so far as known. The eye was probably not examined, however. In this case it would have been interesting to know whether abnormal refraction was coincident with the chorea.

Dr. Wyman has also mentioned to me a case of chorea which was apparently caused by worms (ascarides) in the lower bowel,

and in which the patient recovered on the removal of this cause of nervous irritation.

Most persons have observed that when they were tired by labor of almost any kind, their movements have frequently become tremulous. This tremor may be made to very closely resemble chorea by severely and suddenly overtasking the muscles of the body, as occurs in rapidly climbing a ladder, or even in rapidly ascending stairs, lifting heavy weights, etc. It is worthy of remark that in these cases the imperfect control of muscles is greatest in those muscles which have been most severely overtaxed—of those in the arms when they have been most strained, and in the legs when the legs have been subjected to the greatest strain. Although in these cases the choreic movements usually soon pass away after cessation of the muscular action which caused them, it is conceivable that in certain cases the nervous system may be unable to again recover its former vigor, and the sudden cause may thus result in the persistent tremor called chorea. Dr. Stevens seems to recognize this, except that he supposes it only to occur in individuals suffering from abnormal refraction of the eye, for he says: "Or, perhaps, while on the verge of a loss of control over his muscles, a sudden fright or disappointment becomes the last infliction beyond which the tired and exhausted nervous system can endure no more." It certainly seems rational, however, to look for a persistent cause of a persistent disease, and this is entirely in favor of Dr. Stevens' view so far as it supposes eye strain to be *a* cause of chorea, but if persistent irritation and strain in the muscles of the eye will cause chorea, there seems *a priori* no weighty reason why persistent irritation and strain in other muscles *may* not have a similar result, and in the cases mentioned by Dr. Wyman no other explanation than this would seem to account for all the facts.*

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*The essential difference between the causation of chorea and of tetanus is certainly a question of importance. I have elsewhere suggested the question whether choreic and tonic spasms may not be dependent upon causes the same in kind, but different in degree; but I now desire to suggest the question whether it is not true that, in a majority of cases, chorea results from the impressions upon the nervous system which lead to *exhaustion of voluntary nervous energy*, while tetanus results from those irritations or impressions which lead to powerful stimulation first of the *sympathetic* nervous system, the action of which is slowly excited but much more

Chronic movements are not infrequent among old persons, but that such movements have some special cause apart from age appears probable from the fact that not all old people are so affected. Must this affection be attributed in every case to the abnormal refraction which we know so frequently exists in the eyes of old people?

I have observed that certain medicines, particularly quinine, under some circumstances and in certain doses, will temporarily induce a tremulousness bordering upon chorea. This seems to show an extension of the ordinary effect of quinine to the voluntary muscles, its ordinary effect being upon the involuntary (non-striated) muscular system, notably upon the blood-vessels, probably through the influence of the vaso-motor nerves. This (quinine) is a substance which enters the general circulation, and its action in the body is probably in some respects general. The tremulousness induced by it is general. In the cases of chorea mentioned in a communication to this board by Dr. Hull, he spoke of the choreic movements as being similar to those made in the gymnastic exercises which the children had undergone. He said it seemed as though some of those movements had become automatic—involuntary. It seems difficult to acount for this on the supposition that the chorea was mainly dependent upon strain of the "muscles of accommodation," but if we suppose that *chorea may be caused by nervous irritation tending to excessive muscular action in any part of the body*, all these cases seem to receive adequate explanation, and it is entirely in accordance with this view that the choreic movements are first manifested in those muscles which have been most severely overtaxed.

These views have in them so much of probable truth that it seems important that they be tested as fast as possible, and there is strong hope that through better directed efforts for its study in the future this serious disease may soon be definitely placed within the list of preventable diseases. To Dr. George T.

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continuous and then extends to muscles usually under voluntary control, such extension being sometimes partly by reason of pain through irritation or compression of sensitive nerves, but mainly by reason of the close connection between the sympathetic and the cerebro-spinal systems of nerves and their similar distribution.

Stevens, of Albany, N. Y., great credit is due for his very important contribution to our knowledge of this subject. In this connection the communication to this board from Dr. Hull, of this city, should not be forgotten.

LANSING, Mich., September, 1876.